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JAMES D. STEVENS
REISING, ETHINGTON, BARNES, KISSELLE, P.C.
P.O. BOX 4390
TROY, MI 48099

EXAMINER

RIELLEY, ELIZABETH A

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2879 | |

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/787,280

Applicant(s)

TINWELL ET AL.

Examiner

Elizabeth A. Rielley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 27-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/22/06
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Amendment filed 8/21/06 has been entered and considered by the Examiner. Claims 21-26 have been canceled. Currently, claims 1-20 and 27-41 are pending in the instant application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-15, 18-20, 27, 28, 30-39 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibata et al (US 5982080).

In regard to claim 1, Shibata et al ('080) teach a noble metal tip (5; figure 1a and figure 3; column 3 lines 9-18; claim 15) for use with a spark plug electrode (3), comprising: a firing end having a sparking surface (not numbered in the drawings; see figures 1a and 3, 5 has a sparking surface), an attachment end (51; figure 1a and figure 3; column 4 lines 20-31), and a retention feature extending generally radially into said noble metal tip (7; figure 3; column 4 lines 20-31) from an exposed surface of said noble metal tip (9; see figure 3), said retention feature being located adjacent said attachment end (see figure 3).

In regard to claim 2, Shibata et al ('080) teach the noble metal tip has a diameter (see figure 1b).

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In regard to claim 3, Shibata et al ('080) teach the retention feature (7) radially extends only partially through the diameter of said noble metal tip (see figure 1b).

In regard to claims 4 and 28, Shibata et al ('080) teach the retention feature (7) is of a generally conical shape (see figure 1a).

In regard to claims 6 and 30, Shibata et al ('080) teach the retention feature (7) comprises a hole extending inwardly into said noble metal tip (see figure 1a, the welding section 7 makes a hole in chip 5).

In regard to claims 7, 27, and 31, Shibata et al ('080) teach the retention feature (7) radially extends into said noble metal tip (leg 51 of chip 5) by a distance ($L_p = 0.3\text{mm}$; figure 1a; column 8 lines 14-22) that is less than one half of the diameter of said noble metal tip (diameter of 51 = 1.7 mm; column 8 lines 34-58).

In regard to claim 8, Shibata et al ('080) teach the tip further comprises a plurality of said retention features (7), and wherein one or more of said features are located at a first axial position along said tip and one or more of said features are located at a second axial position along said tip, said first and second axial positions being spaced from one another (see figure 1b).

In regard to claims 9, 32, and 35-38, Shibata et al ('080) teach first and second retention features are located at said first axial position and are circumferentially spaced from one another by approximately 180° , and third and fourth retention features are located at said second axial position and are circumferentially spaced from one another by approximately 180° (see figure 1b; four retention features 7

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are spaced 90° from each other, therefore the ones directly across from each other are 180° apart; column 7 lines 48-65).

In regard to claim 10, Shibata et al ('080) teach retention features comprise holes extending inwardly into said noble metal tip (7; the welding spots 7 create holes inside chip 5).

In regard to claims 11 and 18, Shibata et al ('080) teach the noble metal tip is comprised of an Ir-based material (claim 15).

In regard to claim 12, Shibata et al ('080) teach an electrode assembly including the noble metal tip (see figure 1a).

In regard to claims 13 and 20, Shibata et al ('080) teach a spark plug including an electrode assembly for the noble metal tip (see figure 2).

In regard to claim 14, Shibata et al ('080) teach a center electrode assembly (3; figure 1a; column 3 lines 9-25) for use in a spark plug (figure 2), comprising: a center electrode (3) component including a front end having a blind bore formed therein (end 3a), a generally cylindrical noble metal tip secured within said blind bore (5; see figure 1b), said tip including: a firing end having a sparking surface (54; column 3 line 65 to column 4 line 12), an attachment end located within said blind bore (51; column 3 lines 35-44), and retention feature (protruding end 3a; see column 7 lines 24-26), and a fusion layer that extends into said retention feature and locks said noble metal tip to said center electrode (7; column 3 lines 19-34).

In regard to claim 15, Shibata et al ('080) teach the tip further comprises a plurality of said retention features, and wherein one or more of said features are located at a first axial position along said tip and one or more of said features are located at a second axial position along said tip, said first and second axial positions being spaced from one another (figure 1b; column 5 lines 35-42).

In regard to claim 19, Shibata et al ('080) teach the center electrode component (3) is comprised of a nickel-based material (column 7 lines 17-30; specifically Inconel 600) having a thermal conductivity of greater than 30 W/mK during normal spark plug operating temperatures (it is known¹ that Inconel 600 has a thermal conductivity below W/mk during normal spark plug operating temperatures, please see the website for a complete list of thermal conductivities at specific temperatures).

In regard to claim 33, Shibata et al ('080) teach an electrode assembly for a spark plug (figure 1a), comprising: an electrode (3; column 3 lines 9-18); a noble metal tip (5; column 3 lines 44-47) having an attachment end (51; column 3 lines 36-44) and a firing end that includes a sparking surface (54; column 4 lines 7-12), said attachment end being recessed into said electrode (via bore 3a of electrode; column 3 lines 19-25); wherein said noble metal tip includes one or more recessed retention features extending inwardly into said tip from a peripheral surface of said tip (protruding regions 3a extend inwardly into tip at a peripheral surface; see figure 1a; column 7 lines 24-26) at a location intermediate said attachment end and said firing end (see figure 1a); and wherein said tip is locked to said electrode by material that i) includes electrode material without any significant amount of noble metal material (3a holds only electrode material; column 7 lines 24-26), ii) extends into the one or more recessed retention features (see figure 1a), and iii) conforms with the shape of said one or more recessed retention features

¹ <http://www.hightempmetals.com/techdata/hitempInconel600data.php>

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(see figure 1a: 7 does not unshape 3a or 5, therefore 7 conforms to the shapes of the recessed retention feature 3a).

In regard to claim 34, Shibata et al ('080) teach the electrode comprises a center electrode (3; column 3 lines 9-18).

In regard to claim 39, Shibata et al ('080) teach an electrode assembly for a spark plug (figure 1a), comprising: a center electrode (3; column 3 lines 9-25); a noble metal tip (5; column 3 lines 44-47) having an attachment end (51; column 3 lines 35-44) and a firing end (54; column 4 lines 7-12) that includes a sparking surface, said attachment end being recessed into said center electrode (via bore 3a; see figure 1a); wherein said noble metal tip includes one or more preformed retention features (3a; column 7 lines 24-26) extending inwardly into said tip from a peripheral surface of said tip at a location intermediate said attachment end and said firing end (see figure 1a); and wherein said tip is secured to said center electrode by a fusion layer that extends into said one or more preformed retention features (3a; column 7 lines 24-26).

In regard to claim 41, Shibata et al ('080) teach the tip is welded to said center electrode by said fusion layer, whereby said fusion layer includes material from both said tip and said center electrode (column 3 lines 24-44; column 4 lines 20-36). In regard to Applicant's recitation of *welding* the tip to the center electrode, the Examiner notes that the recitation is considered a product by process limitation. It has been recognized that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made

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by a different process,” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113. Therefore, Accordingly, Shibata et al ('080) teachings of a fused layer 7 is considered to meet the claimed recitation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al (US 5982080) in view of Osamura (US 6215235).

In regard to claims 5 and 29, Shibata et al ('080) disclose all the limitations set forth, as described above, except retention feature comprises a groove that extends around the entire circumference of said noble metal tip. Osamura ('235) teach a fusion layer 4 that surrounds the entire circumference of the noble chip (3; column 8 lines 27-45) thereby making a groove into the noble metal chip as taught in Shibata et al ('080; 7; figure 1a) in order to improve the strength of the junction layer (column 2 lines 32-38). Hence, it would have been obvious at the time of the invention to one of ordinary skill in the art to combine the spark plug electrode assembly of Shibata et al ('080) with the orientation of the retention feature grooves as taught by Osamura ('235). Motivation to combine would be to improve the strength of the junction layer.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al (US 5982080).

Shibata et al ('080) is silent regarding the limitations the sparking surface protrudes beyond the end of said center electrode front end by a distance between 0.1 mm-1.0 mm; and sparking surface has a diameter between 0.25 mm-1.0 mm. However, one skilled in the art would reasonably contemplate modifying the device of Shibata et al ('080) to include the claimed measurements, as an obvious matter of design engineering. Applicant's claimed material does not provide unexpected results that are not within the teaching applied, since both the spark plug disclosed in Shibata as well as the spark plug disclosed by the Applicant perform the same function of creating a spark for a combustion engine. Thus, it would have been obvious at the time of the invention to one of ordinary skill in the art to modify the measurements of the spark plug chip. Motivation to combine would be to create a spark plug able to manufacture a spark for a combustion engine.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al (US 5982080) in view of Orjela et al (US 20040239224).

In regard to claim 40, Shibata et al ('080) are silent regarding the limitation that the fusion layer includes only material from said center electrode, whereby said tip is locked to said center electrode. Orjela et al ('224) teach that fusion layer that includes only material from said center electrode (paragraph 2) in order to avoid fusing the noble metal chip (paragraph 2). Hence, it would have been obvious at the time of the invention to one of ordinary skill in the art to modify the spark plug of Shibata to include the fusion layer materials of Orjela. Motivation to combine is to avoid fusing the noble metal chip.

Response to Arguments

Applicant's arguments filed 8/21/06 have been fully considered but they are not persuasive.

In regard to Applicant's argument that the prior art of record fails to teach a retention feature on an exposed surface of the noble metal tip, the Examiner respectfully disagrees. Shibata teaches a retention feature (the hole made by 7) on an exposed surface of the noble metal tip (5) in figure 3.

In regard to Applicant's argument that the prior art of record fails to teach a preformed retention feature, the Examiner respectfully disagrees. Shibata teaches a preformed retention feature in the item of the front end portion 3a that protrudes out of the central electrode 3 to hold the noble metal tip 5 in place (see figure 1a).

In regard to Applicant's argument that the prior art of record fails to teach the noble metal tip locked into an electrode by material that includes electrode material without any significant amount of noble metal material, the Examiner respectfully disagrees. Shibata teaches a retention feature of the front end portion 3a that protrudes out of the central electrode 3 to hold the noble metal tip 5 in place. Therefore the front end portions of the central electrode contains no noble metal chip material.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing

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date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth A. Rielley whose telephone number is 571-272-2117. The examiner can normally be reached on Monday - Friday 7:30 - 4:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Elizabeth Rielley

Examiner
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MARICELI SANTIAGO
PRIMARY EXAMINER